Portland Metal Exposures: Interim Clinical Update February 29, 2016

Jointly developed by Multnomah County Health Department, Oregon Health Authority (OHA), Northwest Pediatric Environmental Health Specialty Unit (NWPEHSU), Oregon Poison Center (OPC)

Background: Elevated levels of airborne arsenic and cadmium have been documented at one site near a glass factory in Portland at approximately SE 22nd and Powell. Preliminary data from a US Forest Service research study suggests elevated cadmium near another glass factory at N Kirby and N Thompson. In addition, the study identified possibly elevated levels of arsenic and nickel in other Portland neighborhoods. Metal levels in tree moss are being used as a guide to identify areas for formal air and soil testing. More information will become available over the next several months. Read more information and view maps by linking to the Department of Environmental Quality and the OHA.

Concern for Human Health Risk: A complete assessment of this situation will take several months to complete; until then we cannot estimate the risk, if any, from exposure near these sites.

Toxicity of Arsenic, Cadmium, Chromium, and Nickel: The benchmark air levels of metals that were documented at the SE 22nd and Powell site are based on the probability of lifetime cancer risk from chronic exposure. The 4 attached brief ToxGuides™ provide more detail on each of these metals.

Who needs to be tested? We are not recommending lab screening at this time. After an environmental assessment is completed, we will update this recommendation. Community concern, however, is high enough that some patients will request testing for themselves or family members. Based on the minimal data currently available, those who spent the most time within about one-half mile of either glass factory have the greatest potential for exposure.

Testing Considerations If you deem screening to be appropriate, then follow the recommendations in the Table; first morning void urine specimens are preferred. Be aware of these considerations and limitations:

- 24 hour urine is not needed; blood tests may be appropriate in some situations but are not recommended for screening.
- No seafood, seaweed or sushi consumption for at least 3 days prior to arsenic testing.
- No nutritional supplements for 3 days before chromium testing.
- Cadmium levels may be elevated in cigarette smokers.
- Delay nickel testing for at least 3 days after consumption of nuts, MRI study with gadolinium or iodinated IV contrast study.
- Arsenic and chromium are rapidly excreted; testing will mostly detect current exposure.
- Cadmium has an extremely long half-life and testing mostly reflects chronic exposure.
- Nickel excretion is complex and can reflect both acute and chronic exposure.
- With the exception of cadmium, human threshold metal levels in urine have not been determined for risk of organ damage.
- Commercial reference labs often focus on occupational monitoring; lab results that identify workplace hazards may not document lower level exposures.
- Testing of hair or nails is not clinically useful and is not currently recommended by federal experts (http://www.atsdr.cdc.gov/HAC/hair_analysis/hair_analysis.pdf).
- **Under no circumstances should chelation or provocation be used before testing since this will invalidate comparison to reference ranges.**

Interpretation Thresholds for additional testing and consultation are listed in the Table, note:

- Results below the limit of detection in micrograms/Liter (mcg/L) do not need medical follow up.
- False positives may occur in results reported in mcg/gram creatinine in children because they excrete less creatinine than adults; results in mcg/L that are undetectable require no action.

Table Screening tests for patients concerned about environmental exposure to metals[1]

Metal	Screening Test	Results requiring additional testing or consultation
Arsenic	Random urine for arsenic[2]	All ages: > 50 mcg/L **inorganic** As[3] All ages: > 200 mcg/L **inorganic** As obtain expert consultation[4]
Cadmium	Random urine for cadmium[5]	All ages: any detectable urine Cadmium, obtain consultation[4]
Chromium	Random urine for chromium	All ages: >5 mcg/L Chromium, obtain consultation[4,6]
Nickel	Random urine for nickel	All ages: > 5.2 mcg/L Nickel obtain consultation[4,6]

[1] Consensus recommendations of, OHA, OPC, and NWPESHU toxicologists using national data and clinical correlation

[2] Total urinary arsenic of > 35 mcg/L should be fractionated to identify inorganic arsenic.

[3] For > 50 mcg/L inorganic arsenic also obtain CBC, electrolytes, BUN, creatinine, urinalysis, AST, ALT, bilirubin, and repeat fractionated urinary arsenic. This guidance is focused on exposure levels that may possibly associated with current end organ damage. Lower degrees of exposures have been associated with neurodevelopmental health outcomes and increased cancer risk but thresholds are not available

[4] Oregon Poison Center (1-800-222-1222)

[5] National norms for blood cadmium are available for children age 1-5 yrs but blood may not accurately reflect chronic exposure

[6] These levels only indicate amounts above laboratory reference upper limits, national norms are not available

Obtaining expert consultation: For patients with lab results exceeding levels listed in Table, obtain additional tests or consultation. Medical toxicology consultation is available through the Oregon Poison Center (1-800-222-1222). If necessary, the Poison Center will refer calls regarding children or pregnancy to the NW PEHSU (1-877-KID-CHEM).

Sharing results with public health agencies: A system for labs to report detectable levels of cadmium was launched on February 18th, 2016. If you wish to report patients' results prior to this time, please fax to 971-673-1100.

Recommendations for patients and families: Any risk from emissions from the glass factories in Portland adds to other exposures from living in a city. Recommendations for patients and families include:

- Always avoid cigarette smoke- among its many harms are arsenic and cadmium.
- Eat a healthy diet including selenium (nuts, whole grains), iron (enriched cereals, meat, beans), calcium (milk products, leafy greens) and folate (beans, spinach, avocado). Dietary deficiency in some of these nutrients can exacerbate metal toxicity.
- Wash hands after working or playing outdoors; soil can be contaminated with a variety of metals.
- Out of an abundance of caution and until we receive updated testing information, families living within one-half mile of factories should avoid consuming backyard produce.